Operations Manual

The most important thing we build is trust.

VETA Monitor Receiver

(VMR)

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Table of Contents

1. Acronyms 5

2. Introduction 6

2.1 Key System Features 6
2.2 General System Information 6
2.3 Warranty 7
2.4 Safe Operating Procedures 8

3. Getting Started 9

3.1 Initial Checkout 9

4. Hardware Overview 12

4.1 VMR Control Panel 12
4.1.1 Monitor Control 12
4.1.1 Received Signal Strength Green LED-s 13
4.1.2 RF Green LED 13
4.1.1 Lock Yellow LED 13
4.1.2 Alarm Red LED 13
4.1.3 Green Config LEDS 1 to 8 13
4.1.4 Config Button 14
4.1.5 RF Button 14
4.1.1 Mode Button 15
4.2 VMR SIDE PANEL 15
4.2.1 Power Switch 15
4.2.2 Communications DB-9 (F) Connector 16
4.2.3 Video 16
4.2.4 Audio 16
4.2.5 External Power 17
4.2.6 RF CONNECTIONS 17
4.3 Using Internal Down-Converters 17

5. Software Control 19

6. Specifications 20

6.1 COFDM RF INPUT 20
6.2 DEMODULATION 20
6.3 VIDEO DECODING 20
6.4 AUDIO DECODING 21
6.5 POWER 21
6.6 Physical 21
6.7 Environmental 21
6.8 RS232 DATA OUTPUT 21
6.9 CONTROL 21
6.10 REMOTE CONTROL 21
6.11 LOCAL MONITORING 22
6.12 REMOTE MONITORING 22

6.13 SECURITY OPTION 22

List of Figures

Figure 1 – Basic VDL Setup 10
Figure 2 – VMR, Top View 12
Figure 3 – VMR, Monitor Controls 12
Figure 4 – VMR, control panel 13
Figure 5 – VMR OSD 14
Figure 6 – VMR Side View 15
Figure 7 – BDC Control Screen 18

List of Tables

Table 1 – Config LED-s 14
Table 2 – Communications Connector 16
Table 3 – Video Connector 16
Table 4 – Audio Connections 16
Table 5 – External Power 17
Table 6 – RF Connections 17

List of Appendices

Appendix A – Troubleshooting Section: LED Indictors 23
Appendix B – Faults 24
Appendix C – Example of Default Configurations Settings for LS-Band 25
Appendix D – Example of Default Configurations Settings for C2-Band 26

Revision History

Version	Date	Main Changes from Previous version	Edited	Checked
X1	9-23-2009	Initial Release	RM	
X2	12/21/2009	Update to sunlight readable monitor	RM	

1. Acronyms

This section lists and describes the various acronyms used in this document.

Name	Meaning
16QAM	16-state Quadrature Amplitude Modulation
A/V	Audio/Video
AES	Advanced Encryption System
ABS	Basic Encryption System (8 bit)
CSM	Compact Surveillance Modem
COFDM	Coded Orthogonal Frequency Division Multiplexing
CVBS	Composite Video
BDC	Block-Down Converter
FEC	Forward Error Correction
GUI	Graphical User Interface
I/O	Input/ Output
KBaud	Kilobaud per second
Kbps	Kilobits per second
Mbps	Megabits per second
MER	Modulation Error Rate
MPEG	Moving Picture Experts Group
NTSC	National Television System Committee
PAL	Phase Alternation Line
QPSK	Quadrature Phase Shift Keying
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
RX	Receiver
S/N	Signal-to-Noise Ratio
THD	Total Harmonic Distortion
TX	Transmitter
VDC	Volts (Direct Current)
VDL	VETA Digital Link
VR	VETA Receiver
VT	VETA Transmitter
VDR	VETA Digital Repeater
UDP	User Datagram Protocol
VNA	VETA Network Adapter

2. Introduction

Cobham Tactical Communications and Surveillance's Very Efficient Transmission Apparatus (VETA) product line provides several key features that enable high-quality and low-latency wireless Audio/Video (A/V) transmission for the most demanding short or long distance point to point or to multipoint transmission applications. VETA uses a robust digital modulation system known as Coded Orthogonal Frequency Division (COFDM) that provides a robust link that is immune to multipath interference and provides crisp, clear pictures in the most difficult of terrains.

This manual provides information on how to operate the VMR (VETA Monitor Receiver) as well as pertinent technical information related to the overall system.

2.1 Key System Features

- 8" Integrated sunlight readable LCD Monitor
- Input Frequency: 0.174 to 7.2 GHz (In-Bands)
- COFDM Demodulation 400[(1)] or 2K Carriers
- Bandwidths from 1.25[(2)]MHz to 8 MHz
- Uses Professional batteries
- Internal Block-Down Converters
- Compact and lightweight
- Secure with ABS / AES 128 or 256 Encryption[(3)]
- Low End to End System Latency (~44mS)

[(1), (2)] 400 carriers is optional with the 1.25 or 2.5MHz RF bandwidths
[(3)] AES 128 or AES 256 are optional

2.2 General System Information

Cobham Tactical Communications and Surveillance's VETA Monitor Receiver (VMR) is a state-of-the-art COFDM receiver for mobile/portable applications. This compact, battery (IDX or Anton Bauer) or DC operated receiver contains two internal Down-Converters (or LNA for UHF applications) for Diversity reception, a VETA compliant Receiver, 8-inch flat screen sunlight readable monitor with headphone. Analog A/V output jacks are provided for viewing on an external monitor. Cobham Tactical Communications and Surveillance's Very Efficient Transmission Apparatus (VETA) Product Line provides several key features that enable high-quality and low-latency wireless Audio/Video (A/V) transmission for the most demanding short or long distance point to point or point to multipoint transmission applications. VETA uses a robust digital modulation system known as Coded Orthogonal Frequency Division Multiplexed (COFDM) that provides a robust link that is immune to multipath interference and provides crisp, clear pictures in the most difficult of terrains!

The VETA product line supports standard DVB-T 2K carriers with 6, 7, or 8 MHz bandwidths. Additionally, optional 1.25 MHz or 2.5 MHz RF bandwidths with 400 carriers that allow both increased reception range and larger quantity of simultaneous A/V links to operate in the same frequency band. The wider bandwidths provide greater throughput that allow the system to transfer the highest quality video. The standard VMR is supplied with dual Diversity inputs and internal RF Block-Down Converters (BDC-s) with a user selected frequency band. The VMR's Maximal Ratio Diversity Combiner provides optimum reception in difficult fading and multipath environments.

One of the biggest problems encountered in the transition from analog to digital A/V systems has been the inherent digital coding/decoding delays that in some digital systems are 400ms or more. The VETA Transmitters & Receivers employ internal MPEG-2 or MPEG-4[4] (User Selectable) Encoders and Decoders with specially designed 'low-delay' coding technology, which provides an end to end latency down to 44ms[5] *without* the introduction of any further MPEG encoding artifacts. This ensures that the picture you see is what is happening *now* - crucial for applications such as surveillance, and law enforcement, where personnel are reacting to real-time events.

Control and status monitoring can be accomplished via the VMR's Rx Control Panel (Top of Unit) or via an external IBM PC and Cobham Tactical Communications and Surveillance's M.S. Windows application control software. Critical performance parameters like Signal to Noise Ratio (SNR), Pre and Post FEC Bit Error Rate (BER) and Packet Errors are provided both on the on the On-Screen Display or M.S. Windows control program.

Security of transmission is ensured by the use of Standard ABS encryption or, for greater security, the optional AES 128 or 256 bit scrambling algorithms can be added.

[4] Option Dependant
[5] 44mS in DVBT modes. Up to 120mS in Narrow Band modes, depends on modulation parameters.

2.3 **Warranty**

Cobham Tactical Communications and Surveillance offers a 12 month standard product warranty. During this period, should the customer encounter a fault with the equipment we recommend the following course of action:

- Check the support section of the website for information on that product and any software/firmware upgrades.
- If fault persists call our support line and report the fault. If fault persists and you are informed to return the product, please obtain an RMA number from the Cobham Tactical Communications and Surveillance support department or website and ship the equipment with the RMA number displayed and a description of the fault. Please email the support section the airway bill/consignment number for tracking purposes.

Depending on the nature of the fault Cobham Tactical Communications and Surveillance endeavors to repair the equipment and return it to the customer within 14 days of the item arriving at our workshops. Obviously it is impossible to cater for all types of faults and to manage 100% replacement part availability, and delays are sometimes inevitable.

Please contact Cobham Tactical Communications and Surveillance for details of packages that can be tailored to meet your individual needs, whether they are service availability, technical training, and local geographic support or dedicated spares holdings.

2.4 **Safe Operating Procedures**

- Ensure that the power supply arrangements are adequate to meet the requirements of VETA product.
- Operate within the environmental limits specified for the product.
- Only authorized, trained personnel should open the product. There are no functions that required the User to gain access to the interior of the product.

3. Getting Started

The VMR is pre-configured by Cobham Tactical Communications and Surveillance prior to shipment, thus is ready to work "right out of the box".

NOTE: Additional cables and antennas may be delivered by Cobham Tactical Communications and Surveillance based on customer application. Contact Cobham Tactical Communications and Surveillance for further information.

3.1 Initial Checkout

Prior to installing a VMR unit into the desired target environment, an initial checkout should be performed to ensure proper operation of the unit. The initial checkout consists of configuring a basic VDL (VETA Digital LINK) wireless link.

Figure 1 shows a basic VETA configuration wireless link. The VMR shown below has the standard default internal down converters. The steps necessary to setup the configuration shown are stated below:

- Install omni-directional antennas (or ones best suited for the application) onto the RF IN A and RF IN B ports on the VMR and one on the SMA RF connector on the Veta transmitter.
- Attach the VT (VETA transmitter) power cable and apply +12VDC to the red pigtail and GND to the black pigtail. Ensure power supply can supply at least 2.5A at +12VDC.
- Attach a composite video source to the BNC video input cable that is located on the VT breakout cable and turn it on.
- Note which VT Configuration LED 1 through 8 is lit (above the CONFIG button); this number must match the receiver, assuming that both VT and VMR have default parameters.
- Press the RF button on the VT to insure that RF signal is On.
- Apply +12Vdc to the VMR.
- Turn on the VMR with the PWR switch on the front panel (up is ON for Battery and down for external Power Supply through 4-pin XLR).
- The VMR is wired such that the decoded video is fed directly into the monitor.
- Ensure the selected green LED1 through 8 (above the CONF button) on VMR and VT match. If not use the CONF button to select the correct configuration, or change actual parameters using Control Software.

- If the configuration LED is flashing green, press the RF button on the front keypad (this action provides power to the internal down converters, which must always be on for VMR to receive RF).
- Press the MODE button to turn on the diagnostic OSD (on screen display).
- After approximately 5 seconds, the link should be established and video provided by the source should be displayed on the monitor. The green RF LED should light as well as the signal strength green LED indicators.
- If the red Alarm LED lights it may be an indication that the receiver is unable to lock to a signal. Check the following:
    - Ensure the receiver and transmitter configuration green LED (1 through 16) located above the CONFIG button are the same. If not press the CONFIG button on either the transmitter or receiver so they match. See section 4.1.3 for details on *Config* LED-s.
    - Ensure the BDCC PWR for the VMR is ON, (Configuration LED should be solid green).
    - Ensure the transmitter RF button has been pressed after applying +12VDC.
    - Use the control cable and GUI to ensure that the following modulation parameters match on both the VETA TX and VMR: Bandwidth, Frequency, Guard Interval and OFDM Polarity.
    - If the TX and RX are physically too close to each other, the RX may overload causing distorted Video. You may reduce the power of the TX (Use RF button) or move the TX & RX further apart.

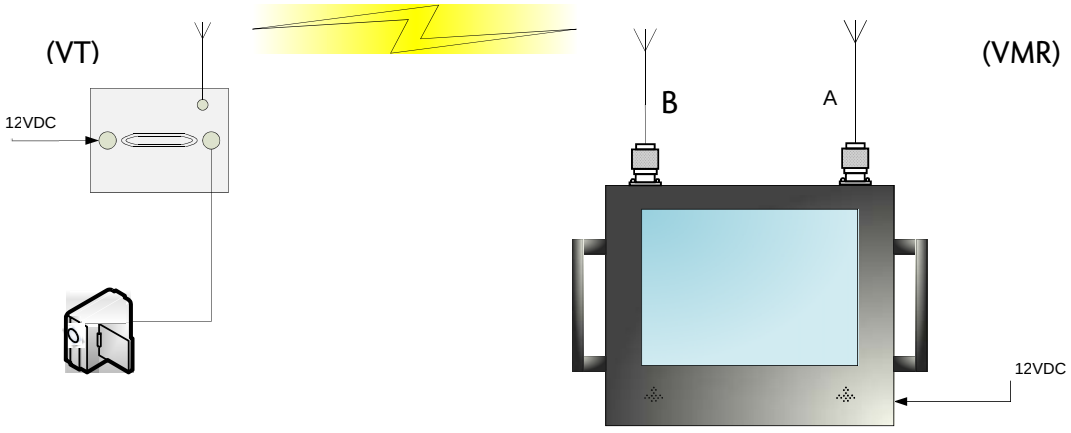

Figure 1 – Basic VDL Setup

The initial checkout described above is simply to check the basic video operation of the VMR unit. For further details on the connectors, monitoring and controlling the VMR read thoroughly through this manual. For information on Control Software refer to manual 100-M0131

4. Hardware Overview

RF connectors of VMR are located on the top of the unit. All other interface connectors are located on the side of the unit. The control panel, located on the top of the unit, consists of a VETA standard push button panel and LED indicators. VMR also has a separate control panel for monitor control located on the top of the unit below main control. The front view, side and control panels of the VMR unit are illustrated in Figure 2, Figure 4 and Figure 6 and discussed in detail in this section.

Figure 2 – VMR, Top View

4.1 VMR Control Panel

The control panel is explained in this section.

4.1.1 Monitor Control

The Monitor Control is located below antennas and controls the monitor settings like brightness, contrast, hue, etc, as well as the sound volume.

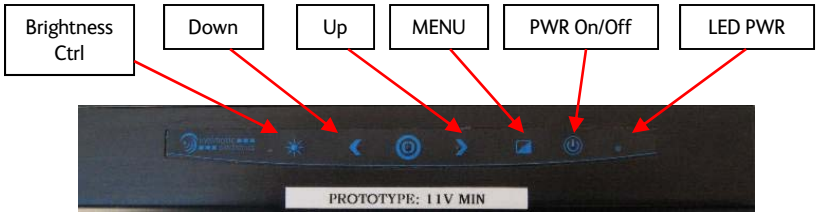

Figure 3 – VMR, Monitor Controls

Figure 3 shows the functions of Monitor Control. To activate *Brightness Ctrl*, first select *Menu*. Now pressing of *Brightness Ctrl* will decrease the brightness of the monitor by 20. VMR also has an automatic brightness control feature for energy saving purposes.

4.1.1 Received Signal Strength Green LED-s

The green LED-s (located above the MODE button) when **ON** indicate the signal strength (the RF input power level) from the minimum (No LEDs Light) to the maximum strength (All four LEDs Light).

4.1.2 RF Green LED

The RF green LED indicator (located above RF button) when **ON** indicates that the VMR is locked to the incoming signal; system is operating normally.

4.1.1 Lock Yellow LED

The LOCK (key icon) yellow LED indicator (located above the RF button) when is **ON** indicates that incoming signal is encrypted.

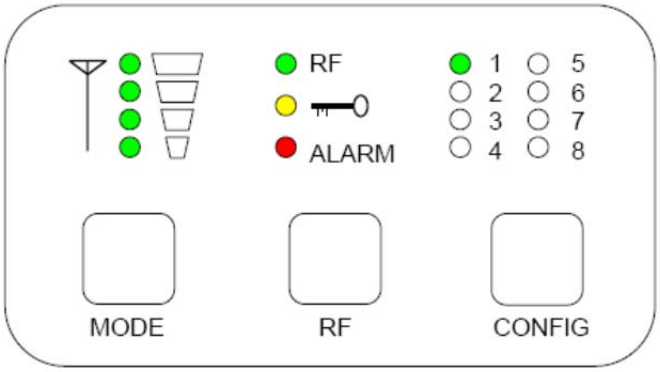

Figure 4 – VMR, control panel

4.1.2 Alarm Red LED

The Alarm red LED indicator (located above the RF button) indicates a fault condition or an alarm when **ON**. This can be an indication that there is no lock of the Transport Stream; no video in the Transport Stream or mismatching Encryption Key.

4.1.3 Green Config LEDS 1 to 8

VMR has an option that can only be set in factory, to have 8 or 16 configurations. In 8 configuration mode, 8 green LEDs (located above the CONFIG button) indicate which one of the stored configurations is currently selected. Configuration number is represented in a binary form using LED-s 1 – 4.

For VMR with 16 configurations combination of Config LED-s determines which configuration number is selected. In this case LED 5 is always *On* and 6, 7 and 8 always are *Off*. The following table shows the correlation between Configuration numbers selected and Config LED-s.

Table 1 – Config LED-s

Config Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LED 1		On		On		On		On		On		On		On		On
LED2			On	On			On	On			On	On			On	On
LED3					On	On	On	On					On	On	On	On
LED4									On	On	On	On	On	On	On	On
LED 5	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On

4.1.4 Config Button

The Config button, when pressed, selects the next configuration from memory. The 16 configurations in memory define all potential variables including center frequency, modulation bandwidth, Guard Interval and OFDM polarity.

☞ Note that this configuration selection (1 through 16) must match the transmitter's OFDM modulation parameters selection for the link to work.

4.1.5 RF Button

Pressing the RF button toggles (ON/OFF) DC power to the Block-Down Converters.

Flashing Config LED indicates OFF state, and solid green – ON state. The VMR must always have power on to BDC for unit to lock to incoming RF.

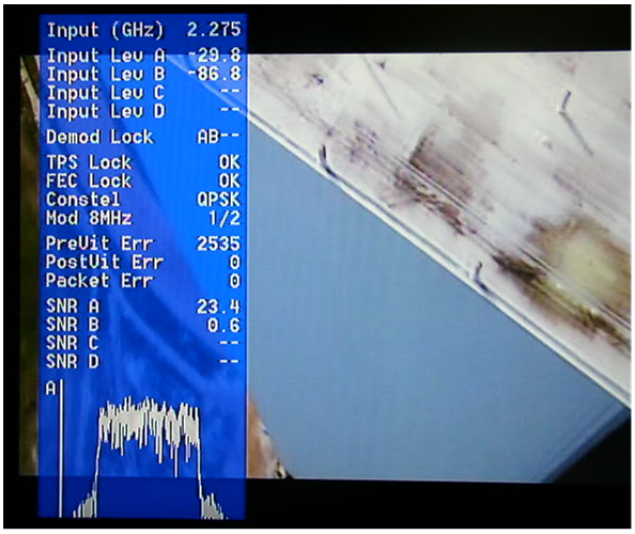

Figure 5 – VMR OSD

4.1.1 Mode Button

Pressing the Mode button toggles the diagnostic On Screen Display (OSD). Pressing the mode button will toggle the OSD on with the spectrum display showing input A from the Composite Video output port. Pressing the mode button a second time will change the spectrum display to input B. Pressing a third time will turn the OSD off. The diagnostic data (displayed on top of the current video) includes, signal to noise data, input power level, frequency as well as some captured parameters from the incoming RF signal, as shown in Figure 5.

4.2 VMR SIDE PANEL

The side panel contains the connectors necessary for interfacing to the VMR. Detailed descriptions of all the VMR connectors and components (see Figure 6) are included in the following sections.

4.2.1 Power Switch

The Power Switch located on the far right side of the panel enables +12VDC to the system; it has three positions: BATT (power supplied from Battery), OFF and EXT (power supplied from External Power supply via 4-pin XLR). On powering the VMR, one of the eight green configuration LED-s will light up (the last one that was active when the VMR power was turned off). In addition the red Alarm LED will light if the VMR is unable to lock to a RF signal.

Figure 6 – VMR Side View

4.2.2 Communications DB-9 (F) Connector

The Communications I/O DB-9 connector provides RS232 control. The receiver can be controlled remotely with Cobham Tactical Communications and Surveillance PC control software (refer to Software Control Manual) using RS232 protocol. The pins and their functions are described in the table below.

Table 2 – Communications Connector

Connector Name	Connector Type	Pin	Function
I/O	DB - 9(F)	1	RS232 GND
I/O	DB - 9(F)	2	CTRL TX
I/O	DB - 9(F)	3	CTRL RX
I/O	DB - 9(F)	4	Data TX
I/O	DB - 9(F)	6	Data RX

4.2.3 Video

One composite video out 75 ohm impedance, PAL/NTSC standard is provided.

Table 3 – Video Connector

Connector Name	Connector Type	Comments
VID	BNC (F)	Composite video out

4.2.4 Audio

Two RCA connectors are provided for audio output. The output level is nominal line level with output impedance of 50 ohm. Audio is single ended. There are no audio gain adjustments on Receiver.

Table 4 – Audio Connections

Connector Name	Connector Type	Function
AUD L	RCA	LEFT AUDIO
AUD R	RCA	RIGHT AUDIO

VMR also has a headphone jack, located above the right handle.

4.2.5 External Power

XLR Connector EXT provides DC power in. The DC nominal voltage is 12VDC, minimum is 9VDC and maximum should not exceed 18 VDC. Reverse polarity protection is provided *but, **no protection for over voltage***.

Table 5 – External Power

Connector Name	Connector Type	Pin	Function	
EXT	XLR	1	GND	
EXT	XLR	4	Power in	9VDC-16VDC

4.2.6 RF CONNECTIONS

The VMR is always configured with internal down converters, which is the normal default hardware setup. Only exception is for UHF units, where the BDC-s are replaced with LNA-s.

Table 6 – RF Connections

Connector Name	Connector Type	Comments
RF IN A	N (F)	To internal down converter
RF IN B	N (F)	To internal down converter

4.3 Using Internal Down-Converters

Down converters have an LO (local oscillator) which is mixed with the DVB-T transmitter frequency and it then converts it to the IF - intermediate frequency. The VMR (VETA receiver) locks on to the IF frequency in order to be able to receive the C-OFDM signal. The VMR calculates the IF frequency based on the LO (in MHz) of the down converter as well as the DVB-T transmitter frequency (in MHz) and whether the LO is using high or low side injection. These parameters must be entered into the Cobham Tactical Communications and Surveillance control software setup screens (see Figure 7). However when the unit leaves the factory, these parameters are pre-configured for the internal down converters. Although the BDC gain setting is not needed for the operation of the system it is used in calculating of input levels displayed by OSD (on screen display).

The OFDM polarity of 'normal' or 'invert' is usually selected based on the polarity of the transmitter signal and on the down converter parameters. Down converters using 'high' side injection invert the polarity of the incoming signal. Down converters with 'Low' side injection do not invert the polarity. For example, if the transmitter is set for 'normal' inversion and the down converter at the VMR side uses 'low' side injection then the 'normal' OFDM polarity is selected.

The BDC Power option turns ON or OFF the +VDC on the IF line to the internal BDCC. *As mentioned before, BDC power must be on for the VMR.*

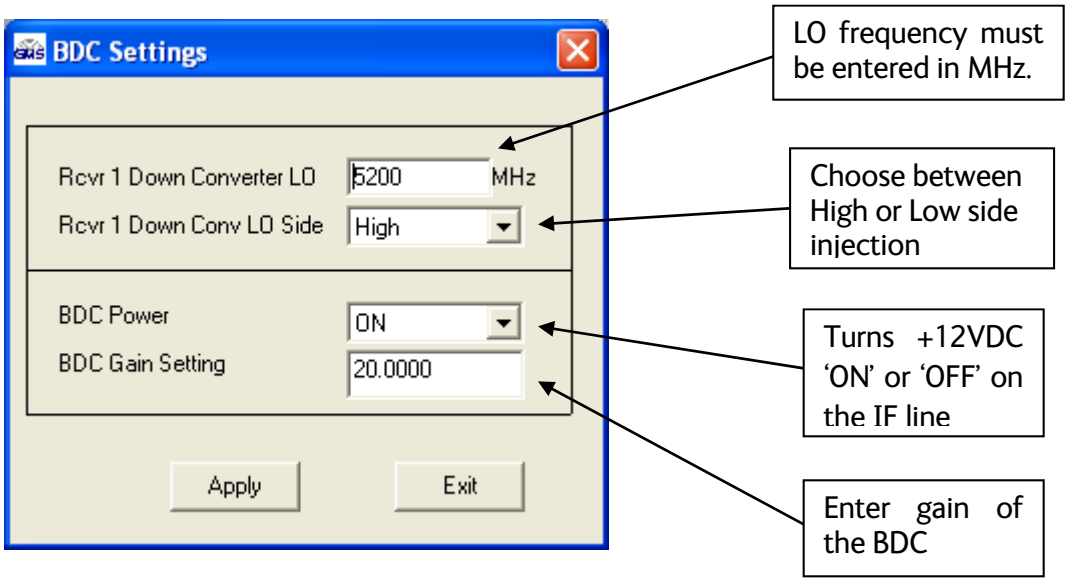

Figure 7 – BDC Control Screen

5. Software Control

Configuration, control and monitoring of the VMR are enabled through the use of Cobham Tactical Communications and Surveillance optional (sold separately) MS Windows-based VMR Configurator software program. Cobham Tactical Communications and Surveillance Part Number for this Software is 8970920-100. This Graphical User Interface (GUI) program provides the end user with a straightforward way to interface with the VMR unit. During normal operation, once a VDL link is established, the VMR Configurator GUI can be used to monitor the link statistics as well as control the receiver. Monitoring the link statistics is an optional operation therefore, if desired, the VMR Configurator GUI does not need to be active and can be disconnected from the VMR unit.

For detailed information refer to the manual 100-M0131

6. Specifications

6.1 COFDM RF INPUT

Input Ports:	2
Connectors:	N - F
Input Impedance:	50 Ohms, <1.5:1 VSWR
Input Frequency:	0.174 to 8.5 GHz (In-Bands)
Frequency Accuracy:	+/-10 ppm

6.2 DEMODULATION

DVB-T # of Carriers:	2k
DVB-T Bandwidth:	8/ 7/ 6 MHz
DVB-T Guard Interval:	1/32, 1/16, 1/8, 1/4
DVB-T FEC	1/2, 2/3, 3/4, 5/6, 7/8
DVB-T Modulation	QPSK, 16 QAM, 64 QAM
Optional VETA Narrow BW Modes	
VETA # of Carriers:	400
VETA Bandwidth:	2.5 MHz or 1.25 MHz
VETA Guard	1/16, 1/8
VETA FEC	1/3, 2/3
VETA Modulation	QPSK, 16 QAM
Threshold: (6, 7, & 8 MHz BW)	
QPSK ½:	<-95 dBm
16-QAM ½:	<-89 dBm
64-QAM ½:	<-83dBm

(Optional Diversity can improve threshold by 2.5 dB)
VETA BW Threshold: -100 dBm to -105dBm

6.3 VIDEO DECODING

Compression Type:	MPEG-2 (Field or Frame Encoding, Selectable)
Compression Standard:	ISO/IEC 13818-2 with Intra-Refresh update mode for low Latency operation
Video format standards:	NTSC or PAL
Profiles:	SP@ML or MP@ML
Chroma Format:	4:2:0 or 4:2:2
Line Standard:	525 and 625 (NTSC/PAL)
Horizontal Resolution:	704, 528, 480, 352 pixels
VETA Systems Latency end to end delay:	Down to ˜44ms for 6, 7, or 8 MHz, Narrow BW to ˜120mS (w/ VETA TX Only, mode dependant)
Video Outputs:	1- Composite w/OSD
Standards:	NTSC (with and without pedestal) or PAL
Video Connectors:	Composite – BNC-F,

Output Impedance:	75 Ohms
Output Level:	1V p-p
Frequency Response:	10 Hz to 4 MHz, +/- 1.5 dB

6.4 AUDIO DECODING

Number of Channels:	2
Decompression Type:	MPEG Layer I & II (Musicam) or NICAM (User Selectable)
Musicam	
Compression Standard:	ISO/IEC 13818-3(Musicam)
Bit rates:	256 Kbit/s/ch (Musicam) All bitrates supported
Sampling Frequency:	32 kHz, or 48 kHz(Musicam)
Nicam (Ultra-Low Latency)	
Bits per Sample:	12 or 8
Sampling Frequency:	32 KHz, 16 KHz or 8 KHz
Frequency Response:	200 Hz to 10 KHz, +/- 1.0 dB Analogue
Audio Outputs:	Un-balanced outputs, Line Level
Output Impedance:	<100 Ohms Unbalanced
Connector:	RCA

6.5 POWER

DC Voltage Range:	9 - 18 V
Power Consumption:	< 28 Watts

6.6 Physical

Dimensions:	12.2" W x 3.5" D x 6.5" H 30.9 cm W x 8.89 cm D x 16.51 cm H
Weight:	5.5 lbs (2.5 kg)

6.7 Environmental

Operational Temperature:	+1 to +40 deg C

6.8 RS232 DATA OUTPUT

Baud Rate:	Up to 115 k baud.
Connector:	DB-9F

6.9 CONTROL

Local Control:	Front Panel with 16 channel/mode select. Preset key selection (1-16).

6.10 REMOTE CONTROL

RS232 Control from PC GUI

All receiver options and functions are controlled (set) via the remote interface

6.11 LOCAL MONITORING

Control Panel: Signal Strength (Bar Graph), Channel & Mode, and Rx Lock, invalid Encryption Key

OSD: Signal to Noise Ratio (SNR), Pre and Post FEC Bit Error Rate (BER) and Packet Errors.

6.12 REMOTE MONITORING

All RX measurements and controls

6.13 SECURITY OPTION

ABS is standard. The VMR can optionally be provided with Advanced Encryption System (AES or B-crypt) 128 or 256 for protecting the signal in sensitive applications.

Appendix A – Troubleshooting Section: LED Indictors

LED condition	Meaning	Action
No Config LED-s lit	Unit is OFF	Turn the unit On
Config LED is flashing	Indicates that BDC power is off	Push the RF button to turn BDC-s On.
Red Alarm Lit RF LED Off	No RF Signal Lock	Ensure that RF source is active and has correct frequency. Ensure that BDC-s are On. Ensure there is no interfering signal
Red Alarm Lit RF LED On	Has RF Signal Lock, but no decoder Lock	Ensure that Video is enabled at the Transmitter. Ensure that scrambling keys matched
Signal strength LED-s off	No incoming RF signal	Ensure that RF source is active.

Appendix B – Faults

Fault	Action
No RF Link	• Check if the following parameters of the Transmitter and corresponding Receiver match: -Frequency -Bandwidth -Guard Interval -Spectral Inversion • Check if the down converters operate correctly: -Correct LO is set -BDC power is On. • Check if the TX Output Power is On.
Poor Link Performance	• Interference. Should an interfering RF signal occur on the same frequency the performance of the link will be affected. Remove the interferer or move to an alternative frequency. • Reduced transmit power, ensure that the attenuation setting on the transmitter is appropriate for direct output, or for amplifiers connected. • No Diversity operation. Ensure both down converters are operational.
Blue screen at receiver	Switch on the OSD if Demod Lock is not ok then – see "No RF Link" section above. If Demod Lock is OK but Packet errors are not 0 then see section Poor Link Performance above. If the OSD Demod Lock is OK and packet errors are 0 then - Check video is enabled at the transmitter. -Check correct unit name is selected at the receiver to match the transmitter. -Check scrambling keys are matched.
Reduced Image quality	•Image quality is affected by the selected horizontal resolution. The image will become progressively softer for each horizontal resolution below the sharpest resolution of 704 pixels. It is advisable to select a horizontal resolution that matches the resolution of the camera. •Image quality is also affected by the video bit rate which can be read from the video bit rate field of the transmitter controller). The standard setting is 2.3Mb/s. However enabling audio, particularly the high quality audio modes, will reduce the video bit rate substantially. Therefore ensure an appropriate audio mode is selected or audio is fully disabled. •Ensure that bit rate of transmitted signal is higher that of the received signal in the Repeater.

Appendix C – Example of Default Configurations Settings for LS-Band

PARAMETER	CONFIGURATIONS															
Config #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Unit Mode	DVBT	DVBT	DVBT	DVBT	DVBT	DVBT	DVBT	DVBT	DVBT	DVBT	DVBT	DVBT	DVBT	NB	NB	NB
BDC LO	2550	2550	2550	2550	2550	2550	2550	2550	2550	2550	2550	2550	2550	2550	2550	2550
BDC Side	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
BDC Gain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COFDM BW	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	6Mhz	6Mhz	6Mhz	7Mhz	2.5Mhz	2.5Mhz	2.5Mhz
RF Frequency	1755	1802	1850	1755	1802	1850	2200	2300	2400	2200	2300	2400	2345	1802	2300	1802
Modulation GI	1/4	1/4	1/4	1/8	1/8	1/8	1/8	1/8	1/8	1/32	1/32	1/32	1/4	1/16	1/16	1/16
OFDM Polarity	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Invert	Invert	Invert
NTSC Format	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC
Blue Screen on no Video	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MPEG4 deblocking Filter	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
On screen Display	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Auto Spect Detect	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Descrambling	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LNB Power	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Power up Video Format	525	525	525	525	525	525	525	525	525	525	525	525	525	525	525	525

Appendix D – Example of Default Configurations Settings for C2-Band

PARAMETER	CONFIGURATIONS															
Config #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Unit Mode	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	NB	NB	NB
BDC LO	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200
BDC Side	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
BDC Gain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COFDM BW	8 MHz	8 MHz	8 MHz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	7Mhz	2.5Mhz	2.5Mhz	2.5Mhz
RF Frequency	4400	4700	5000	4400	4700	5000	4400	4700	5000	4400	4700	5000	4400	4700	5000	4400
Modulation GI	1/4	1/4	1/4	1/8	1/8	1/8	1/8	1/8	1/8	1/32	1/32	1/32	1/16	1/16	1/16	1/16
OFDM Polarity	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
NTSC Format	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC
Blue Screen on no Video	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MPEG4 deblocking Filter	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
On screen Display	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Auto Spect Detect	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Descrambling	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LNB Power	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Pwr up Video Format	525	525	525	525	525	525	525	525	525	525	525	525	525	525	525	525